

FOREST STEWARDSHIP PLAN

**Horsetooth Tract
Colorado State University Research Foundation
PO Box 483
Fort Collins, CO 80522
970-482-2916**

Property Legal Description:

**Parcel number: 0726000905 and 0723000934
80 acres in the SW ¼ of the NE ¼ & the NW ¼ of the SE ¼ of Section 26 and
40 acres in the NE ¼ of the SE ¼ of Section 23
Township 7 N, Range 70 W
6th Principal Meridian
Larimer County, Colorado**

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Purpose of the Plan

This plan was prepared by the Colorado State Forest Service, Fort Collins District, and meets the requirements of the Forest Stewardship Program, HB-1229 "The Managed Forest Land Act", and the American Tree Farm System.

The plan's primary purpose is to provide forest management recommendations that meet the listed objectives. It should be studied for information and used as a reference when implementing forest management activities on the property.

This plan should be updated in 10 years by a professional forester to reflect changes in the forest, owner's objectives, forest product markets and the forest ecosystem.

Objectives

The primary natural resource objectives for this property include:

- 1) Maintain a healthy and aesthetically pleasing woodland property by:
 - Enhancing species diversity
 - Reducing the fire hazard
 - Controlling insects and diseases
 - Improving the habitat for wildlife including wild turkey, grouse, cavity nesting songbirds, and big game
- 2) Provide guidance for protecting critical infrastructure on the property from the risk of wildfire.

General Property Description

Location

The whole Horsetooth Tract owned by Colorado State University Research Foundation (CSURF) consists of 2 pieces of land. The larger piece is 80 acres and is bordered on its northern, eastern, and southern boundaries by the Horsetooth Mountain Park. Its west boundary is bordered by private landowners. The second, smaller piece is 40 acres and is bordered on its eastern and southern boundary by the Horsetooth Mountain Park. The 40 acre piece will be referred to singularly as Mill Creek. Both properties together will be referred to as the Horsetooth Tract.

This property consists of 2 parcels identified as numbers 0726000905 and 0723000934. The 80 acre piece is located in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ & the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 26 and the 40 acre piece, Mill Creek, is located in the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 23, in Township 7 N, Range 70 W, 6th Principal Meridian, Larimer County, CO. The property's total area is 120 acres.

Map 1 shows the location of the Horsetooth Tract.

Topography

The highest elevation on the 80 acre piece of the Horsetooth Tract is at approximately 7190 feet above mean sea level and is located in the southeastern corner of the property. The lowest elevation is located along the western boundary of the property and is approximately 6500 feet above mean sea level. The topography is highly variable, ranging from gently sloping grassy hills to steep rocky cliffs and narrow drainages.

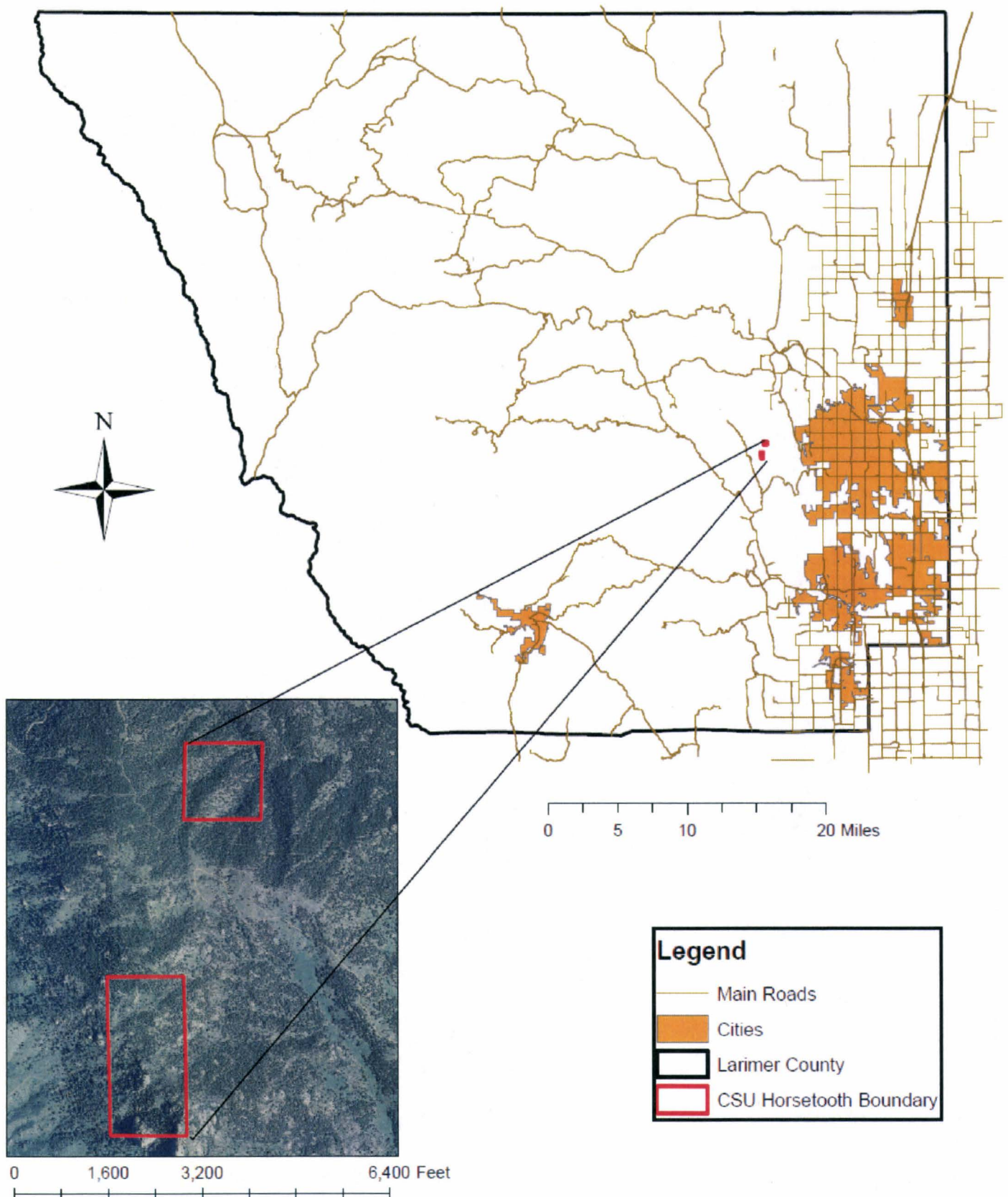
On the Mill Creek portion the highest elevation is at approximately 6780 feet above mean sea level in the southwest corner. The lowest elevation of this portion of the property is in the northeast portion at approximately 6210 feet above mean sea level.

Refer to Map 2 for details of the topography.

Roads and Trails

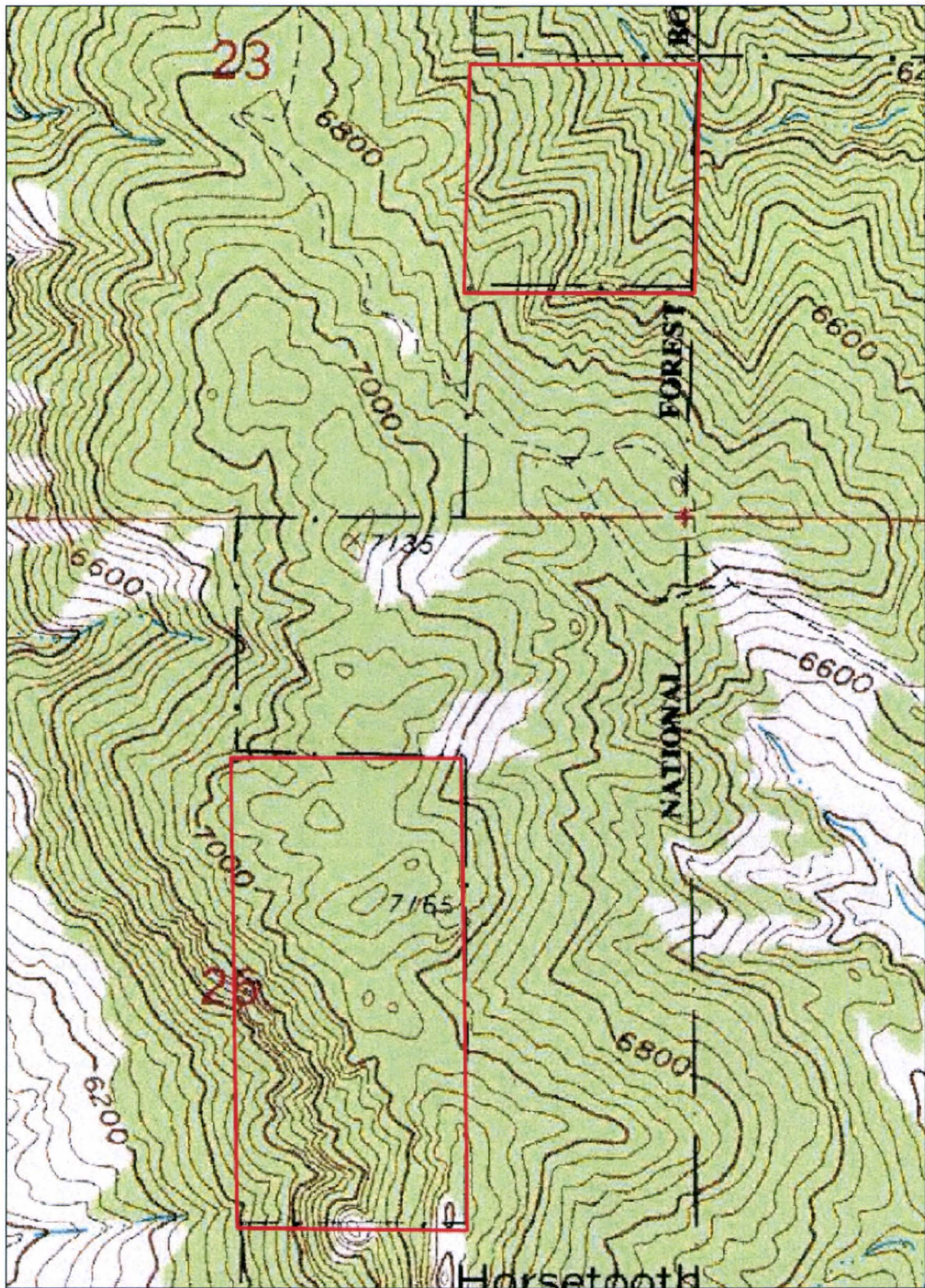
Towers road is accessed through a locked gate on the east side of the park from Shoreline Drive. This road provides access to the towers located on the 80 acre piece of the Horsetooth Tract. There are also some unmarked trails that run north and south through the central part of the property. The Mill Creek portion was accessed via Upper Towers Road.

Map 1. Horsetooth Tract Location





Map 2: Horsetooth Tract Topography



Legend

 Horsetooth Tract Boundaries

0 450 900 1,800 2,700 3,600 Feet

Climate

Climate at the Horsetooth Tract is typical of the Front Range foothills, with warm to hot summers and cold winters. Most of the 14 inches of annual precipitation falls as summer showers and thunderstorms. Snow can cover the ground for most of the winter. Chinook winds, which blow down slope and are dry and warm, often melt and evaporate the snow and increase fire danger.

Of the total precipitation, 10.5 inches, or 75 percent, generally falls during the period from April through September. Thunderstorms number about 44 each year, 24 of which occur in July and August. The average seasonal snowfall is about 48 inches. On the average, 18 days have at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

Average relative humidity in mid-afternoon in spring is about 35 percent, and during the rest of the year is about 42 percent. The average relative humidity at dawn is 75 percent.

In winter the average temperature is 29 degrees Fahrenheit and the average daily low is 17 degrees. Summer temperatures average 60 degrees, with an average daily high of 76 degrees, though temperatures above 90 are not uncommon.

Land Use

Prior to Euro-American settlement of the western United States, the Horsetooth Mountain area was used by Native American peoples as a hunting and gathering ground. In the 1800's the land was used for fur trapping and trading, gold prospecting, sandstone quarrying and recreation by early migrants to the area. In more recent years, the property was used regularly for cattle grazing, timber harvesting, quarrying, and farming by some of the areas early settlers such as the Herringtons, Culvers, and Soderbergs.

Colorado State University acquired the property in 1923 through a patent, signed by President Warren G. Harding. The property and its roads must be maintained so that the current land use, communication towers, can work effectively.

Special Sites

No special sites were found in the field survey. Special sites may include: historic burial ruins, old cemeteries, cave entrances, rare mineral outcroppings, and unique ecological communities. These sites can be identified by the landowner or a reliable outside organization. Useful resources to identify special sites can be found here:

http://www.treefarmssystem.org/cms/pages/95_1.html.

Resource Inventory

The variable plot cruising method is used to inventory forest resources. Thirty-three plots were taken on the 80 acre piece and 16 on the 40 acre piece, Mill Creek. The inventory gathers information on stand type, plot location, slope, aspect, tree height and diameter, regeneration, site index, ground cover, fuel loading, wildlife sign, insects and disease. Site tree information was collected and is used as an indicator of land productivity. The field inventory is summarized in the management unit descriptions and in Appendix A. General information on tree species is located in Appendix B.

Insect and Disease

Mountain pine beetle and dwarf mistletoe are two major insect and disease agents impacting both parts of the Horsetooth Tract. Forest management operations should be aimed at mitigating the spread and negative effects of these agents. Management strategies, including control methods are discussed below.

Mountain pine beetle infestations were identified in the inventory in areas throughout the property. These locations have been designated with a red triangle in both Map 3 and 4. In addition, there may be other areas on the property with current mountain pine beetle activity. Trees harboring the beetles should be cut and appropriately treated by the end of June each year to prevent the beetles from infesting surrounding trees. Appropriate treatment includes bark removal (using chainsaw debarker attachment or hand peeler), chipping, solar treatment, milling, or burying under eight inches of soil. If it is not feasible to treat all infested trees, focus on areas where dead trees are a significant safety hazard, such as near access areas.

Dead trees may begin to fall 5-15 years after mortality, and possibly even earlier. Some dead trees with old beetle infestations where the beetles have already flown from the trees may be left for wildlife uses. However, if there are a significant number of these trees they should be removed to reduce the wildfire hazard. The property should be monitored yearly for further activity.

In addition to treating infested wood, there are a few things you can do to increase the chance of survival for currently un-infested trees. Thinning is often recommended. This reduces competition for resources between the trees allowing them to stay healthy and thus less attractive to bark beetles, and more likely to pitch beetles out if they are attacked. See the individual Management Units for thinning recommendations. Also, do not stack firewood or pile slash (branches and tree removal waste) against live trees. This attracts the beetles to those trees. Chipping or lopping and scattering are the best ways to deal with slash so it is the least attractive to beetles. Also, watch for flying beetles or fresh beetle attacks when cutting between July 1st and September 1st, since the mountain pine beetle flight occurs during this time. Lastly, there are preventive sprays available for your most susceptible and highest value trees. For more information on identification, treatment, and prevention of mountain pine beetle see Appendix G.

There are also several locations of the both the portions of the Horsetooth Tract where ponderosa pines are infected with the parasitic plant dwarf mistletoe. These areas can be identified by the

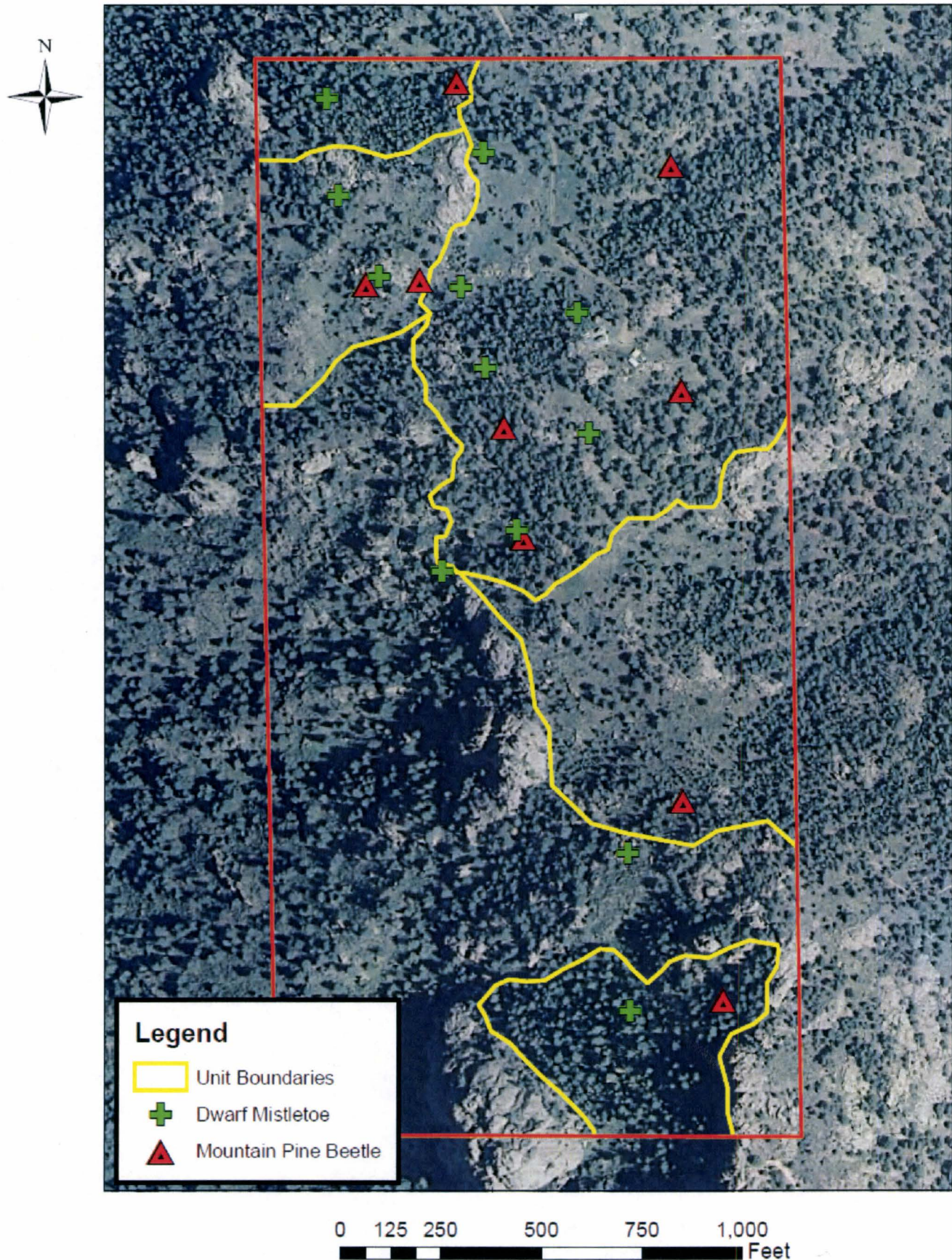
green crosses in Map 3 and 4. Containment of the mistletoe is a priority for the entire Horsetooth Tract, so that it does not spread to the surrounding healthy trees.

Dwarf mistletoe spreads through seed distribution. Seeds travel 30 feet on average to reach and infect a tree. It is recommended that all pine trees within 50 or more feet inside the perimeter of the area of infection be removed. A 50 foot buffer area will help contain the infestation until the entire area can be treated; however this may not be feasible given the aggressiveness of the parasite on this property. Pruning infested branches and/or planting resistant species are alternative options, though they are much less feasible on a large scale. Refer to the individual management units for the presence and treatment of the dwarf mistletoe. Focus on the areas where dwarf mistletoe is most aggressive and continue to monitor for dwarf mistletoe throughout the property. Refer to Appendix G for more information on detection and biology of dwarf mistletoe.

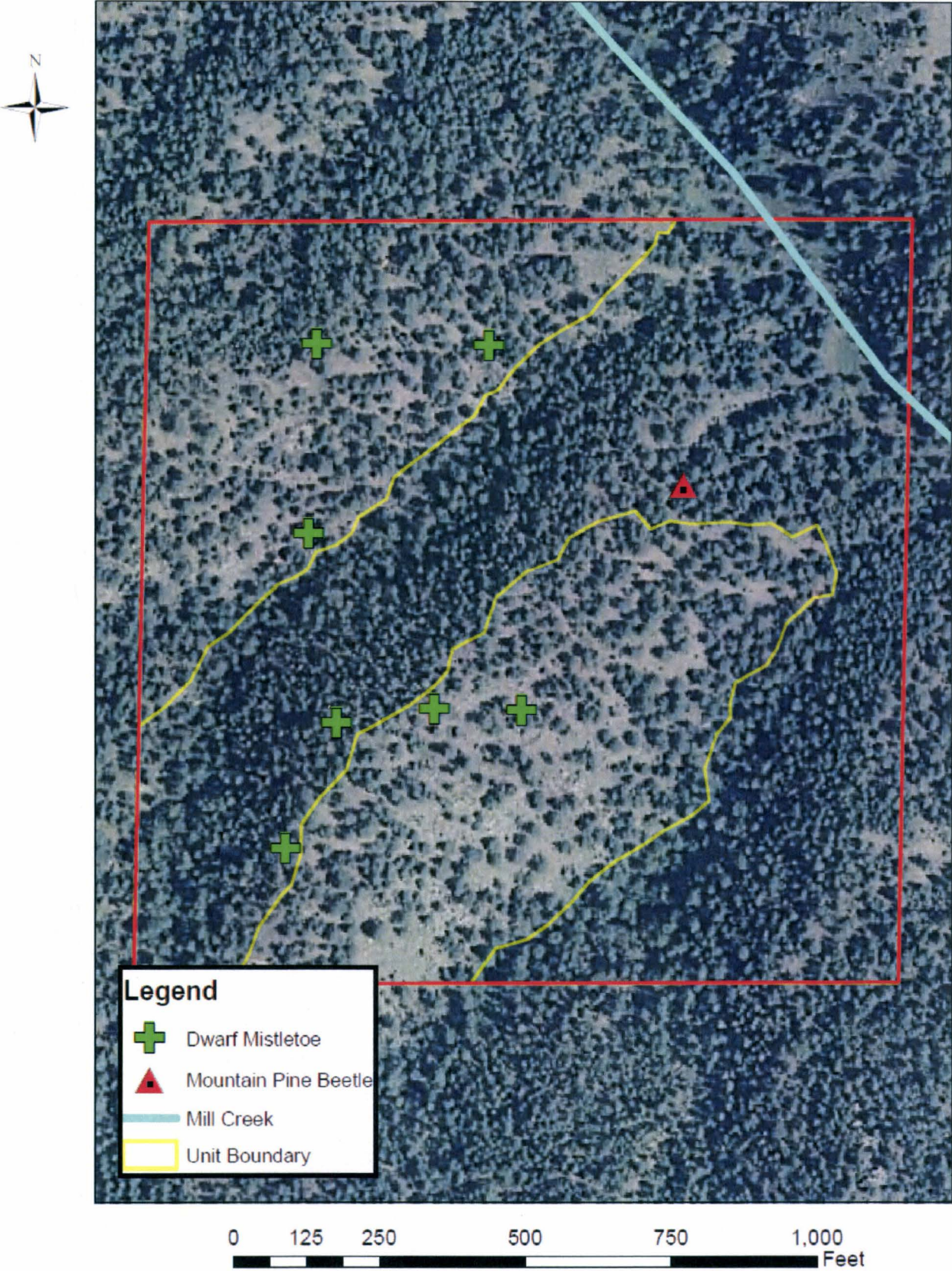
Regarding all insect and disease problems, maintaining healthy and vigorous trees will encourage tree defense mechanisms. The American Tree Farm System encourages all landowners to “make practical efforts to prevent, eradicate or otherwise control invasive species using a range of integrated pest management methods.” Integrated pest management might consist of pesticide use, physical removal methods and preventative methods.

Treatment is scheduled for 2010 in management unit 2 of the Horsetooth Tract, to reduce wildfire hazard. Mountain pine beetle infested trees in the treatment area will be targeted for removal. This treatment was made possible by American Recovery and Reinvestment Act (ARRA) funding and will be performed by Anchor point, a consulting firm, and Larimer County.

Map 3: Horsetooth Tract, 80 Acre, Insects and Disease



Map 4: Horsetooth Tract, Mill Creek, Insects and Disease



Wildlife

The Horsetooth Tract property provides several types of cover and food sources for wildlife. In the commonly used sense, cover is something that protects an animal or bird from weather or enemies, or provides places to rest, reproduce, and to raise young. Trees, shrubs, plants, geomorphic structures, and topographical features provide cover on the property. Plants such as bitterbrush and aspen are also food sources.

During the forest inventory many signs of deer were seen such as droppings, rubs on trees, game trails. Recommendations for forest management activities within this document take into account the various species or groups of species found on the property and are intended to protect or enhance the existing cover and/or food sources. Recommendations address vertical as well as horizontal spatial arrangements of cover. For example, some species have rather demanding vertical cover requirements in terms of nesting, feeding, and roosting (squirrels, turkeys, hawks, eagles) as opposed to those that demand adequate cover for concealment from aerial predators (mice, ground squirrels, rabbits).

Refer to Appendix E for wildlife specifications and a map of Colorado's High Priority Habitats within Private Land Focus Areas. This map can also be found here:

<http://wildlife.state.co.us/NR/rdonlyres/C11416FA-34D7-4876-8206-E192C7BEA190/0/FigI1ColoradoHighPriorityHabitatsPrivateLandFocus.pdf>.

Threatened and Endangered Species

No threatened or endangered (T&E) species were noticed or known to be on this site. The Preble's meadow jumping mouse is found in heavily vegetated, shrub-dominated riparian habitats and immediately adjacent upland habitats along the foothills on the eastern edge of the Front Range of Colorado. This species is listed as threatened on both the federal and state lists, but it is not thought to be a major concern in forested areas. Refer to Appendix E for T&E species lists from the Division of Wildlife (DOW) and the U.S. Fish and Wildlife Service (USFWS).

Please visit this DOW website:

(<http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList/ListOfThreatenedAndEndangeredSpecies.htm>)

Or this USFWS website:

(http://www.fws.gov/ecos/ajax/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=CO&s8fid=112761032792&s8fid=112762573902&s8fid=24012765323362) for more information.

Water

The Mill Creek stream runs across the northeast corner of the property (shown in Map 4). There are also two major drainages that drain to the northeast into Mill Creek; both comprise most of

Unit 7. The first runs from the southwest corner to the northwest corner and does contain a spring and intermittent stream. The second drainage runs across the entire southeast corner of the Mill Creek property.

Refer to Appendix K for more information on water conservation. Information on Best Management Practices (BMPs) to protect water quality is available online:

<http://csfs.colostate.edu/pdfs/ForestryBMP-CO-2010.pdf>.

Wildfire Hazards

Wildfire hazard on this property is mapped from moderate to very high hazard (see Map 5). These hazards are mapped based on the expected fire behavior which is determined by vegetative cover type and habitat structural stage. However, if the aspect is south or southwest, and/or if the slope is greater than 30 percent, increase the hazard class one category. Also, if slash is present and in significant quantities, increase the hazard class one category. Most of the Horsetooth Tract is mapped as very high fire hazard.

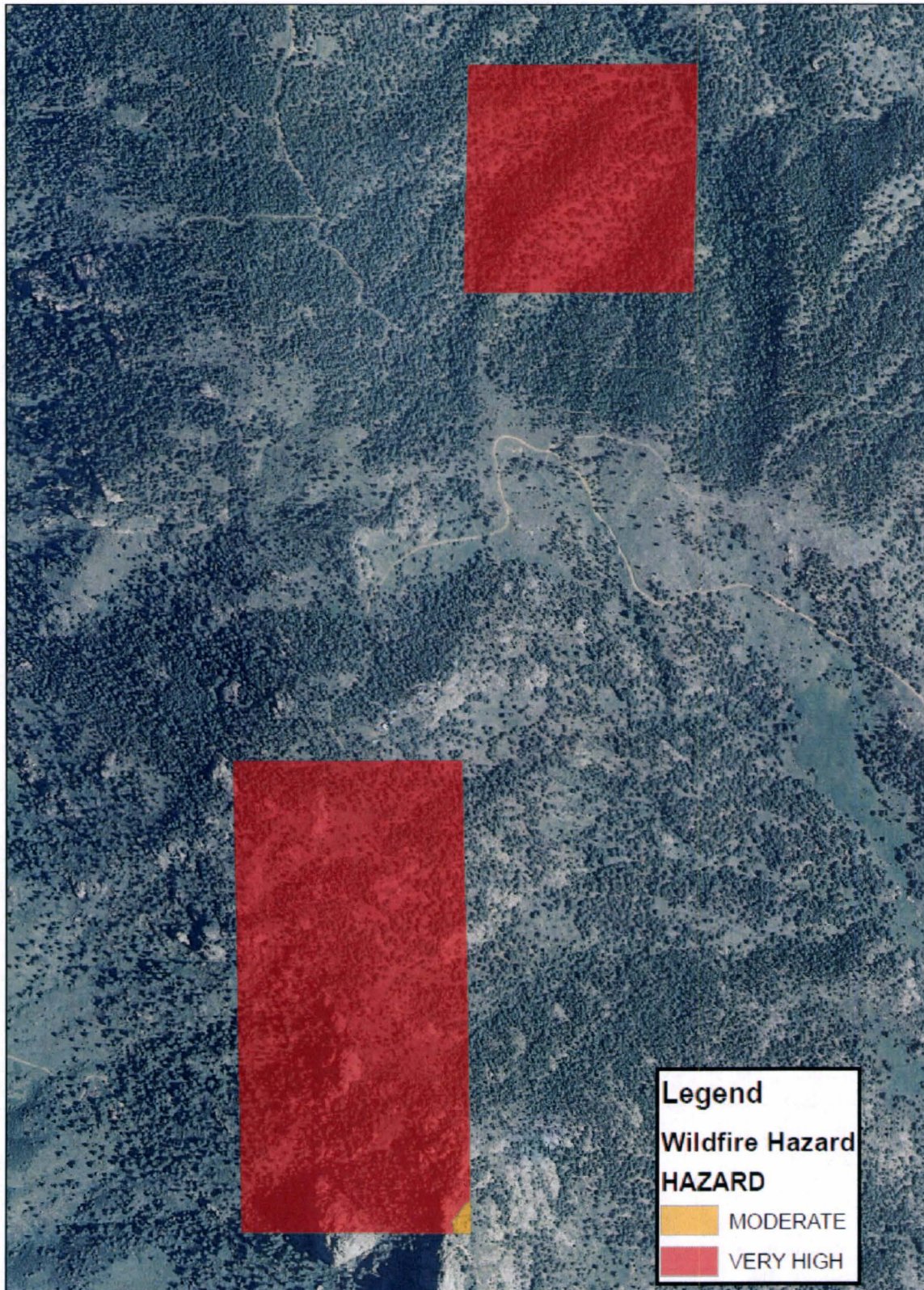
Expected fire behavior of Wildfire Hazard Classes

Hazard Class*	Expected Fire Behavior
Low	Low intensity/short duration fires. Flame lengths 0-4 feet, higher flare-ups rare; duration of highest flames brief; fire spread slow to fast, 1-40 acres per hour; spotting rare, short range.
Moderate	Moderate intensity/longer duration fires. Flame lengths 4-8 feet, intermittent flare-ups occurring to many feet above tree tops; short and medium range spotting common; behavior between flare-ups as in low class.
High	High intensity/medium duration fires. Flame lengths 5-20 feet, of brief duration; fire spread usually fast, at least 40 acres per hour; short range spotting common from blowing leaves.
Very High	High intensity/longer duration fires. Flame lengths greater than 8 feet, flare-ups higher than trees frequent to continuous; spread up to several hundred acres per hour; fire front impassable; spotting several hundred yards common, possible to a mile or more.

* If the aspect is south or southwest, and/or if the slope is greater than 30%, increase hazard class one category. If slash is present in significant quantities, increase hazard class one category.



Map 5: Horsetooth Tract Wildfire Hazard



0 300 600 1,200 1,800 2,400 Feet

Soils

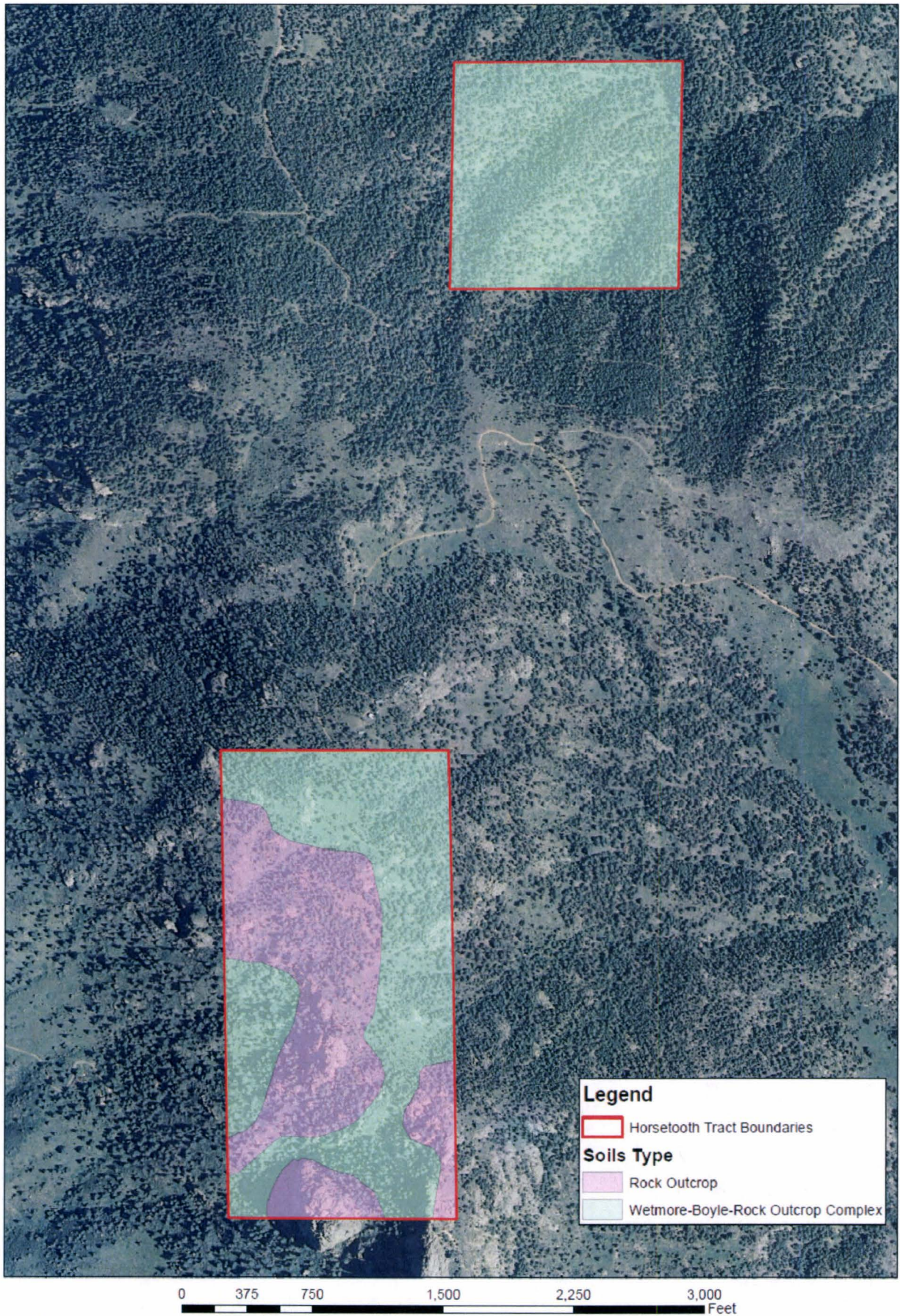
Two different soil types constitute the Horsetooth Tract as seen in Map 6. The soils on the property are made up of Rock Outcrop and Wetmore-Boyle-Rock outcrop complex. Note the runoff rate and hazard of erosion for each soil type. A complete description of each soil type as defined by the USDA soil survey follows:

93 – Rock Outcrop. This type is bare or nearly bare rock. Included in the mapping are areas of shallow and very shallow soils, mainly around the edges of the mapped areas. Runoff is rapid and the hazard of erosion is severe on the included soils and in adjacent areas that receive runoff. This type is used mainly for wildlife habitat and aesthetic purposes. Capability unit VIIIs-1, dry land; not assigned to a range site or a windbreak suitability group.

117 – Wetmore-Boyle-Rock outcrop complex, 5 to 60 percent slopes. This complex consists of strongly sloping to very steep soils on mountainsides and ridges. It is about 35 percent Wetmore gravelly sandy loam, about 30 percent Boyle gravelly sandy loam, and about 25 percent Rock outcrop. Wetmore gravelly sandy loam is in forest, Boyle gravelly sandy loam is in open grassed areas, and Rock outcrop occurs throughout but is commonly near ridges and steeper. The Wetmore soil has the profile described as representative of the Wetmore series. The Boyle soil has a profile similar to the one described as representative of the Boyle series. Included with these soils in mapping are minor areas of Redfeather and Schofield soils. Runoff is rapid, and the hazard of erosion is severe. These soils are suited to woodland or native grasses they are also used for recreation, as sites for summer homes, and for wildlife habitat. Capability unit VIIIs-1, to a range site, and Boyle soil in Rocky Loam range site, woodland suitability group 6x1; not assigned to a windbreak suitability group.



Map 6: Horsetooth Tract Soils



Management Units: Descriptions and Recommendations

This section describes the management units identified on the Horsetooth Tract. General information on management practices, slash disposal, growing stock levels (GSLs), insects, disease, harvesting methods, wildlife management, and wildfire hazard mitigation are found in the Appendices. Technical terms used are defined in the Glossary.

The following recommendations are intended to meet the short and long term objectives for managing the property. As with all management plans, the scheduling and achievement of these activities will depend upon the landowner's resources, environmental conditions, availability of technical assistance, and commercial markets. The landowner should work closely with a professional forester to update this plan as circumstances change and work is accomplished.

Records of accomplishment, time spent on management activities, and income/loss statements should also be kept.

Management Units

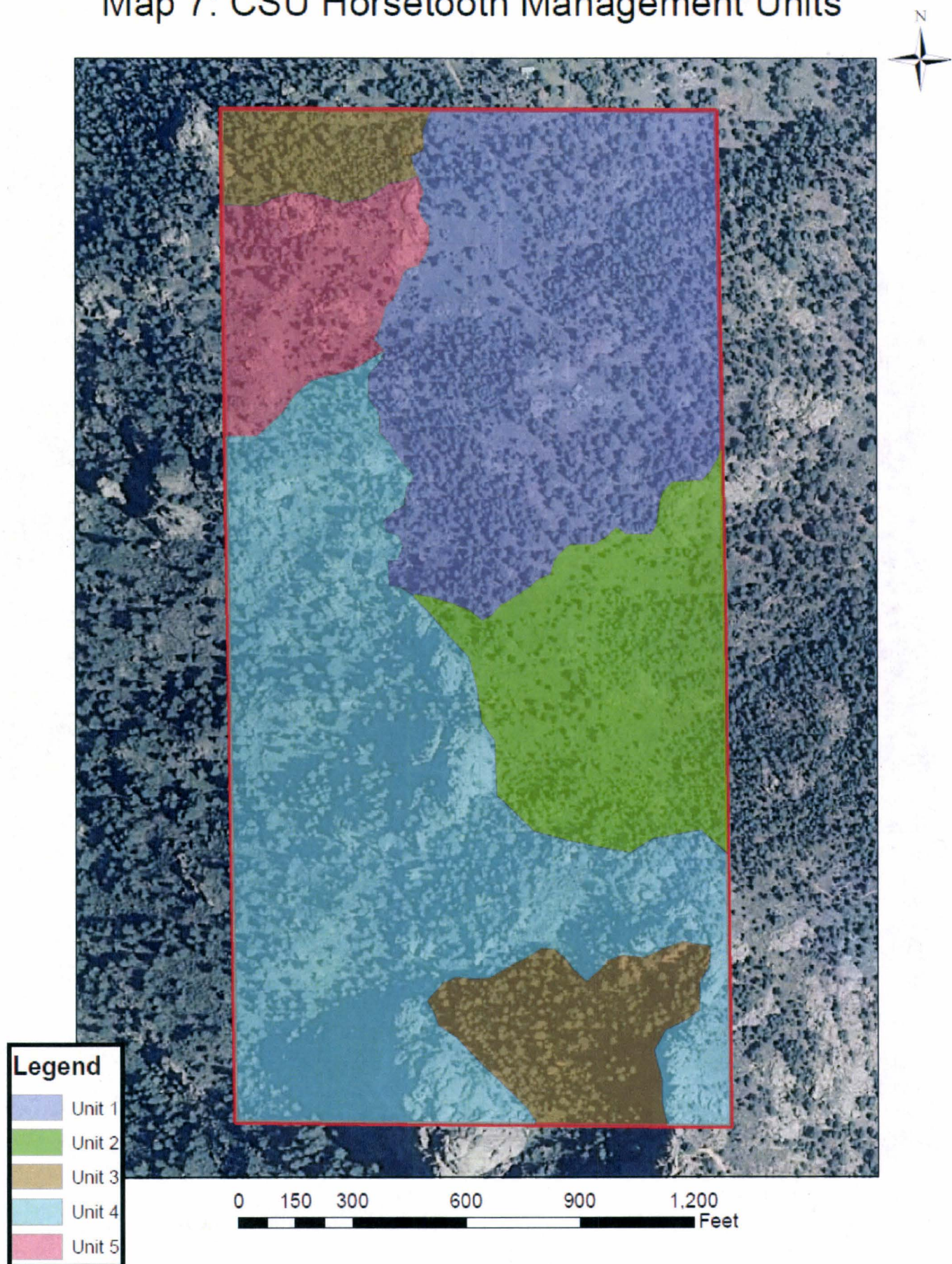
In order to guide management and categorize the various forest types and conditions, the Horsetooth Tract was divided into 7 management units, between both the 80 acre area and the 40 acre, Mill Creek area. The units were delineated based on the current forest conditions that have been influenced primarily by aspect, access and forest cover. The forest cover in Horsetooth Tract consists of mostly ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) with a small component of aspen (*Populus tremuloides*). Units range in density from very open meadow areas to thick Douglas-fir stands. Forest cover types are the result of topographic and soils influences, insect and disease infestations, light and water availability, and previous management activities.

Age was measured on a subsample of the average-sized co-dominant ponderosa pines and Douglas-fir trees. Ages ranged from 65 years to 125 years on the ponderosa pines and from 82 years to 105 years on the Douglas-firs in the 80 acre portion of the Horsetooth Tract. The average age of both ponderosa pine and Douglas-fir was 92 years. The last 10 years of growth on this unit ranged from 1/2" to 7/8" for ponderosa pine and from 5/16" to 1/2" for Douglas-fir; while the best 10 years of growth ranged from 3/4" to 1 and 1/2" for ponderosa pine and from 3/4" to 1 and 3/4" for Douglas-fir. These ranges indicate that not all trees were meeting their growth potential.

In the Mill Creek area, ages ranged from 105 years to 140 years in the ponderosa pines and from 85 years to 155 years in the Douglas-firs. The average age of ponderosa pine was 119 and of Douglas-fir was 112 years. The last 10 years of growth on this unit was 1/2" for ponderosa pine and ranged from 1/4" to 1/2" for Douglas-fir; while the best 10 years of growth ranged from 5/8" to 3/4" for ponderosa pine and from 3/4" to 1 and 1/8" for Douglas-fir. These ranges indicate that not all trees were meeting their growth potential. There certainly are trees on the Horsetooth Tract that are both younger and older than the average sized trees sampled.

Map 7 illustrates the management units in the 80 acre piece of Horsetooth Tract and Map 8 shows the units in the Mill Creek area. These 7 units will be described in the following section. The statistics given are for trees that are 3" DBH or greater unless otherwise noted. Thinning and/or fuels reduction treatments that have occurred over the past 10 years within a unit will be noted, as well as any future management needs.

Map 7: CSU Horsetooth Management Units



Management Unit 1



Description: Unit 1 is 22 acres of ponderosa pine and Douglas-fir. The slopes in this unit range between 10 and 35 percent and have aspects of southwest, south, southeast, east, north, and northeast. Mountain pine beetle infested trees were present in some areas; those noted were designated on Map 3. Dwarf mistletoe was also a serious and fairly widespread problem in this unit. There is also evidence of storm damage, most likely from a late snowfall in the spring of 2009. This area is a proposed treatment area and will be thinned by Larimer County in 2010-2011, through ARRA funding.

The trees have an average DBH of 9.6 inches and an average height of 35 feet. Unit 1 contains areas with open growing trees and also areas with more dense pockets. The average basal area across the unit is 63 square feet per acre, which is a healthy stocking level for this mixed conifer stand. Regenerating trees include 86 ponderosa pine and 79 Douglas-fir saplings, and 57 ponderosa pine and 136 Douglas-fir seedlings per acre.

Some of the shrubs present in the unit include common juniper, bitter brush, currant, mountain mahogany, choke cherry, Rocky Mountain juniper, rabbit brush, and cliff bush. Grasses and

other herbaceous species are present in the understory and include fringed sage, mullein, and prickly pear.

Unit 1 is mapped as having a very high wildfire hazard.

The following table summarizes the stand data:

Forest cover type	Mix of ponderosa pine and Douglas-fir
Unit size	22 acres
Slope	0-35%
Aspect	Southwest, south, southeast, east, north, and northeast
Basal area (average)	63 square feet/acre
Trees/acre ($\geq 3"$ DBH)	83 ponderosa pine 25 Douglas-fir 108 Total
Average tree diameter	9.6" DBH
Average tree height	35 feet
Stocking	Near healthy tree density, treatment is scheduled
Estimated stand volumes	842 cubic feet/acre 3252 board feet/acre
Sapling trees/acre (<3" DBH and >4.5' high)	86 ponderosa pine and 79 Douglas-fir
Seedling trees/acre (<4.5' high)	57 ponderosa pine and 136 Douglas-fir
Wildfire hazard rating	Very high

Recommendations: The priority for this unit is the management for health and diversity and to mitigate wildfire danger to existing transmission towers. This unit should be maintained at a growing stock level (GSL) between 60 and 80. Though the basal area in this unit is within this

range, some thinning is necessary in order to remove trees hit by the mountain pine beetle and dwarf mistletoe and to protect the communication towers from wildfire. Mitigation of both of these issues will involve removing infested trees, in-order to minimize the spread of the mistletoe and mountain pine beetles. See the Insect and Disease section and Appendix G for more information. Treatment is scheduled for this unit in 2010-2011. Treatment will also involve some fuels mitigation to help decrease the potential fire hazard; removal of infested trees will also help to meet this objective.

The tables in Appendix F provide general spacing guidelines based on the desired GSL and the average diameter. While many of the trees to be removed may be smaller and suppressed, be sure to leave a good distribution of healthy trees from all age (or diameter) classes.

The removal of infested trees will serve to help reduce competition for resources, thus allowing the trees to grow at a rate closer to the potential productivity for the land. This thinning will also reduce the fire hazard and the potential for future insect and disease spread. Smaller, stressed, understory trees are often more vulnerable and once infected can introduce disease to otherwise healthy surrounding trees.

The slash generated by the suggested activities can be processed in several different ways. The most cost effective and least labor-intensive method, but also the most unsightly, is to lop and scatter the slash. It is important that the scattered slash be no more than 10" high to ensure a more rapid decomposition and create less of a fire hazard. A second option is to pile and burn the slash in an open area after obtaining a permit. Guidelines for burning slash can be found in Appendix D. The most expensive and labor intensive option is to chip the slash. Because of this, chipping is probably not the best option for a landowner treating large amounts of slash. However, the benefit is that the chips can be sprayed out over the area where they will decompose in the least amount of time. This option is also the least likely to attract and harbor the Ips beetle.

The property boundary should be marked for the entire Horsetooth Tract.

Management Unit 2



Description: Unit 2 consists of 12 acres mixed ponderosa pine and Douglas-fir that was treated in 2009. There is a considerable amount of slash scattered throughout this unit. This unit contains slopes between 5 and 35 percent on northeast, south, and west aspects. Despite past treatment, mountain pine beetle infested trees were still present in several areas. Dwarf mistletoe was not observed in this unit, but it may have been mitigated as part of the treatment.

Rocky Mountain juniper, common juniper, currant, kinnikinnick, and cliff bush, are found in the understory. Grasses are present in Unit 2, as well as fringed sage and junco.

The average tree diameter is 11.4 inches with an average height of 42.9 feet. With an average of 87 square feet of basal area per acre, the unit is near a healthy stocking level for a targeted GSL of 80. Regeneration is moderate with 33 ponderosa pine and 33 Douglas-fir seedlings per acre. There were also patches of aspen regeneration, averaging at 67 seedlings and 67 saplings per acre. Additionally, there are 67 Douglas-fir saplings per acre.

Unit 2 is mapped as having a very high wildfire hazard.

The following table summarizes the stand data:

Forest cover type	Mixed ponderosa pine and Douglas-fir
Unit size	12 acres
Slope	30-35%
Aspect	Northeast, south, and west
Basal area (average)	87 square feet/acre
Trees/acre ($\geq 3''$ DBH)	65 ponderosa pine 53 Douglas-fir 118 all species combined
Average tree diameter	11.4'' DBH
Average tree height	42.9 feet
Stocking	Healthy tree density
Estimated stand volumes	1291 cubic feet/acre 5321 board feet/acre
Sapling trees/acre (<3'' DBH and >4.5' high)	67 Douglas-fir 67 aspen
Seedling trees/acre (<4.5' high)	33 ponderosa pine 33 Douglas-fir 67 aspen
Wildfire hazard rating	Very high

Recommendations: The priority for Unit 2 is management for health and diversity. This unit should be maintained at a growing stock level (GSL) of 80. Though this unit has already been treated some additional thinning is necessary in order to remove trees hit by the mountain pine beetle. Mitigation will involve removing infested trees, in-order to minimize the spread of the mountain pine beetles. See the Insect and Disease section and Appendix G for more

information. This unit should also be monitored for dwarf mistletoe, since adjacent units are infested.

The table in Appendix F entitled *Growing Stock Level 80* has general spacing guidelines based on the desired GSL and the average diameter. While many of the trees to be removed may be smaller and suppressed, be sure to leave a good distribution of healthy trees from all age (or diameter) classes. In general, the same management guidelines and slash treatment should be followed as in Unit 1, which will also help with fuels mitigation.

Management Unit 3



Description: Unit 3 is 8 acres of Douglas fir with some ponderosa pine mixed in. The slopes in this unit range between 25 and 50 percent and include west and southwest aspects. Dwarf mistletoe was present on some ponderosa pines in this unit.

Only Douglas-fir trees were captured in the basal area estimates, these trees have an average DBH of 9.9 inches and an average height of 39 feet. The average basal area in this unit is 60 square feet per acre, which is a healthy overall growing stock level for this stand of trees. However, it appeared that patches in this unit were well above the recommended stocking level and could use some thinning. Regeneration is moderate with 100 ponderosa pine seedlings per acre, and 50 Douglas-fir seedlings per acre.

Some of the shrubs present in the unit include currant and choke cherry. Grass patches were present in the understory.

Unit 2 is mapped as having a very high wildfire hazard.

The following table summarizes the stand data:

Forest cover type	Douglas-fir with some ponderosa pine
Unit size	8 acres
Slope	25-50%
Aspect	West and southwest
Basal area (average)	60 square feet/acre
Trees/acre ($\geq 3''$ DBH)	87 Douglas-fir
Average tree diameter	9.9" DBH
Average tree height	39 feet
Stocking	Healthy tree density, between 60 and 80 square feet/acre
Estimated stand volumes	1172 cubic feet/acre 5546 board feet/acre
Sapling trees/acre (<3" DBH and >4.5' high)	
Seedling trees/acre (<4.5' high)	100 ponderosa pine 50 Douglas-fir
Wildfire hazard rating	Very high

Recommendations: The priority for Unit 3 is management for health and diversity. This unit should be maintained at a growing stock level between 60 and 80 square feet/acre. However, mitigation of dwarf mistletoe trees may require an even lower basal area in some portions of this unit. Dwarf-mistletoe might be managed and contained in this unit if the infected trees are removed. Creating a 50 foot buffer may be appropriate, to prevent spread. Forest management activities will be feasible in the portion of Unit 3 located in the far northwest corner of the property. The remaining piece of this unit, located along the southern boundary, is steep and has very low access, making forest management there a low priority. In general the same slash disposal guidelines should be followed as in Unit 1.

Management Unit 4



Description: Unit 4 is 32 acres of extremely rocky and steep terrain. Large portions of this unit are inaccessible. The slopes in this unit range between 20 and 60 percent and have a west aspect. Mountain pine beetle infested trees were present in some areas. Dwarf mistletoe is a problem in portions of this unit.

The trees have an average DBH of 11.3 inches and an average height of 37 feet. With 80 square feet of basal area, the unit is adequately stocked for the recommended growing stock level (GSL) of 80. Regeneration is moderate with 57 Douglas-fir seedlings and 86 ponderosa pine saplings.

Some of the shrubs present in the unit include currant, bitterbrush, Rocky Mountain juniper, choke cherry, common juniper, and cliff bush. Grasses are present in the understory, as well as prickly pear and mullein.

This unit is mapped as a very high fire hazard, though a small portion of the south west corner is only a moderate fire hazard.

The following table summarizes the stand data:

Forest cover type	Ponderosa pine and Douglas-fir
Unit size	32 acres
Slope	20-60%
Aspect	West
Basal area (average)	80 square feet/acre
Trees/acre ($\geq 3"$ DBH)	78 Ponderosa pine 24 Douglas-fir 102 total
Average tree diameter	11.3" DBH
Average tree height	37 feet
Stocking	Healthy tree density
Estimated stand volumes	1246 cubic feet/acre 5344 board feet/acre
Sapling trees/acre (<3" DBH and >4.5' high)	86 Ponderosa pine
Seedling trees/acre (<4.5' high)	57 Douglas-fir
Wildfire hazard rating	Moderate and very high

Recommendations: The priority for Unit 4 is management for health and diversity. This unit should be maintained at a growing stock level of 80. However, mitigation of dwarf mistletoe trees may require an even lower basal area in some areas. If managed, the same treatment and slash disposal guidelines should be followed as in previous units. This unit was extremely rocky and inaccessible in places, thus it is a low priority for forest management.

Management Unit 5



Description: Unit 5 consists of 6 acres of meadow and open ponderosa pine with patches of regeneration. Blow-down created several openings that are regenerating well. This unit has a 20 percent slope and a west and southwest aspect. Again, mountain pine beetle infested trees were present in some areas. Dwarf mistletoe was extremely aggressive, especially in sapling stage ponderosa pines. These stressors appear to be the cause of a great deal of blow down and woody debris in this unit. There were signs of past management in this unit, though not within recent years.

No basal area of trees greater than 3 inches was recorded on these plots, though there were sparse patches of mature trees in this unit. Basal area was estimated to range from 5-15 square feet per acre.

Some of the shrubs present in the unit include currant and Rocky Mountain juniper. Grasses were abundant in the understory. Sage, mullein, and prickly pear were also present.

Successful regeneration was recorded in this unit. Ponderosa pine regeneration showed approximately 250 seedlings and 50 saplings per acre. Douglas-fir had about 50 saplings per acre.

The following table summarizes the stand data:

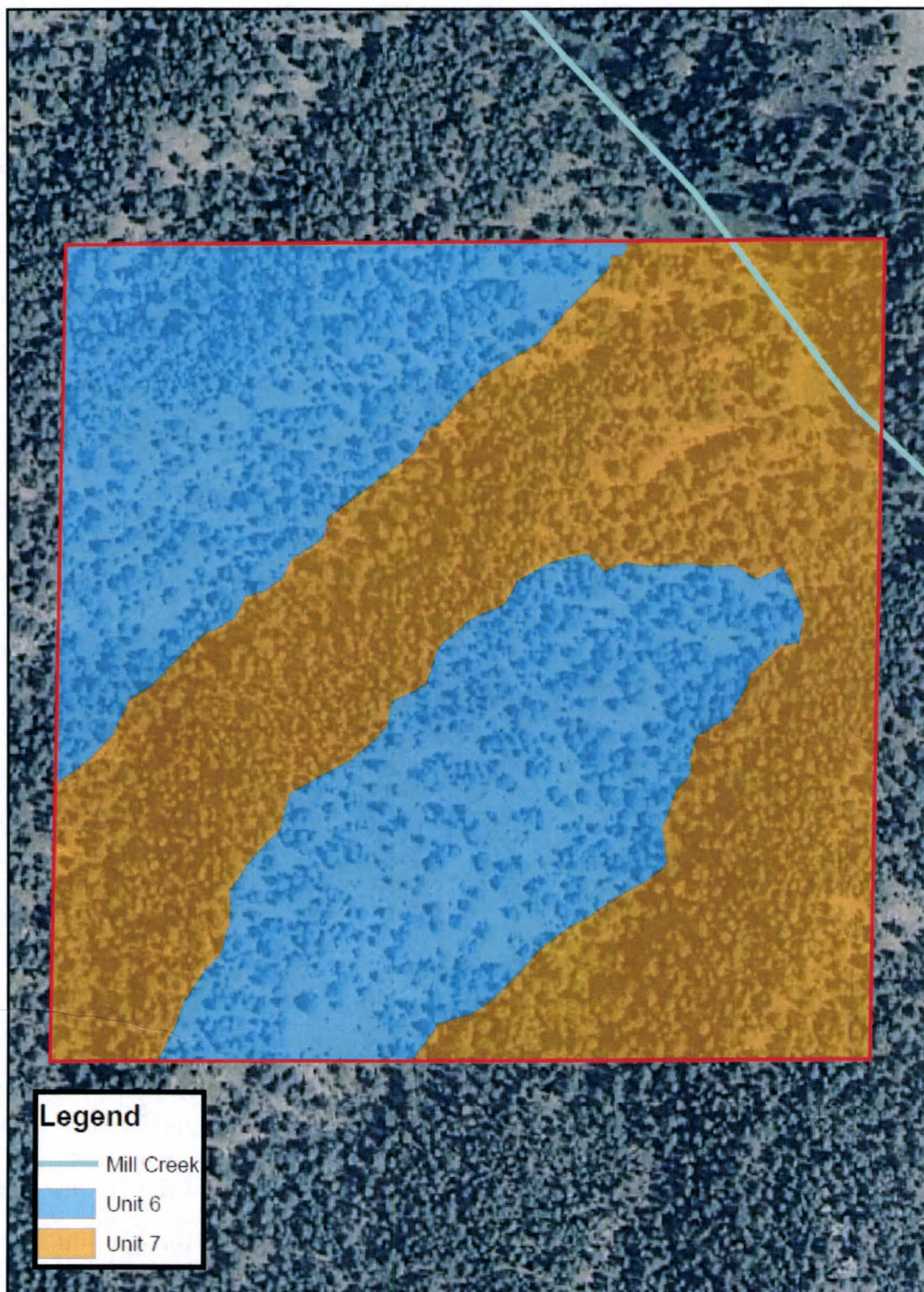
Forest cover type	Open ponderosa pine regeneration and meadow.
Unit size	6 acres
Slope	20%
Aspect	Southwest and west
Basal area (average)	5-15 square feet/ acre
Trees/acre ($\geq 3"$ DBH)	5-15
Average tree diameter	
Average tree height	
Stocking	Very low
Sapling trees/acre ($< 3"$ DBH and $> 4.5'$ high)	50 Ponderosa pine 50 Douglas-fir
Seedling trees/acre ($< 4.5'$ high)	250 Ponderosa pine
Wildfire hazard rating	Very high

Recommendations: This unit should be thinned concentrating on the ponderosa pine saplings infested with dwarf mistletoe. Creating a 50 foot buffer may be appropriate, to prevent spread. Thinning activities should also be directed to advance Douglas-fir saplings and any other underrepresented species to improve diversity in this unit. This thinning will reduce the potential for further insect and disease infestation. Smaller, stressed, understory trees are often more vulnerable and once infected can introduce disease to otherwise healthy surrounding trees.

The slash generated from the cut should be treated as described in Unit 1.



Map 8: Mill Creek Management Units



0 125 250 500 750 1,000 Feet

Management Unit 6



Description: Unit 6 is 21 acres within the Mill Creek portion of Horsetooth Tract. This unit consists of open ponderosa pine mixed with Douglas-fir. It is less dense overall than the remainder of the Mill Creek property, described in Unit 7. The slopes in this unit range between 30 and 60 percent and aspects include east, northeast, and west (most slopes are east and northeast). Some portions of this unit were heavily impacted by dwarf mistletoe.

The trees have an average DBH of 11.6 inches and an average height of 39 feet. Tree stocking is at a healthy level with an average of 63 square feet of basal area per acre. Regeneration is good with 143 ponderosa pine and 43 Douglas-fir seedlings, and 29 ponderosa pine saplings.

Some of the shrubs present in the unit include currant, Rocky Mountain juniper, cliff bush, and common juniper. Grasses are present in most of the understory, as well as some sedge in the moist areas. Other understory plants include mullein, poison ivy, prickly pear, and fringed sage.

This unit is mapped as a very high fire hazard.

The following table summarizes the stand data:

Forest cover type	Open ponderosa pine and Douglas-fir
Unit Size	21 acres
Slope	30-60%
Aspect	East, northeast, and west
Basal area (average)	63 square feet/acre
Trees/acre ($\geq 3''$ DBH)	66 Ponderosa pine 16 Douglas-fir 82 total
Average tree diameter	11.6" DBH
Average tree height	39 feet
Stocking	Health tree density
Estimated stand volumes	866 cubic feet/acre 3094 board feet/acre
Sapling trees/acre (<3" DBH and >4.5' high)	143 Ponderosa pine 43 Douglas-fir
Seedling trees/acre (<4.5' high)	29 Ponderosa pine
Wildfire hazard rating	Very high

Recommendations: The priority for Unit 6 is management for health and diversity. This unit should be maintained at the current growing stock level. However, mitigation of dwarf mistletoe trees may require an even lower basal area in some areas. Creating a 50 foot buffer may be appropriate, to prevent spread. In general the same management and slash disposal guidelines should be followed as in previous units. In areas that have species other than pine; the management should be to improve growing conditions for these species. This unit was extremely rocky and difficult to access in places, thus it is a low priority for forest management. Forest management is most feasible in the portions of this unit that are in the southwest corner of the property.

Management Unit 7



Description: Unit 7 is 19 acres of Douglas-fir and ponderosa pine within and around the 2 main drainages of this property. Large portions of this unit are very steep, rocky, and inaccessible. The slopes in this unit range between 30 and 60 percent and have a north, northeast, or east aspect. Both dwarf mistletoe and mountain pine beetle were present in portions of this unit.

The trees have an average DBH of 9.6 inches and an average height of 34 feet. With 82 square feet of basal area, the unit is adequately stocked for the recommended growing stock level (GSL) of 80. Regeneration is high with 500 Douglas-fir and 22 ponderosa pine seedlings, as well as 211 Douglas-fir and 100 ponderosa pine saplings.

Some of the shrubs present in the unit include common juniper, currant, cliff bush, snowberry, Rocky Mountain maple, Rocky Mountain juniper, choke cherry, and rose. Grasses are present in the understory, as well as fringed sage.

This unit is mapped as a very high fire hazard.

The following table summarizes the stand data:

Forest cover type	Douglas-fir and ponderosa pine
Unit size	19 acres
Slope	30-60%
Aspect	North, northeast, or east aspect
Basal area (average)	82 square feet/acre
Trees/acre ($\geq 3''$ DBH)	73 Ponderosa pine 64 Douglas-fir 137 total
Average tree diameter	11.27'' DBH
Average tree height	34 feet
Stocking	Health tree density
Estimated stand volumes	1211 cubic feet/acre 5020 board feet/acre
Sapling trees/acre (<3'' DBH and >4.5' high)	500 Douglas-fir 22 Ponderosa pine
Seedling trees/acre (<4.5' high)	211 Douglas-fir 100 Ponderosa pine
Wildfire hazard rating	Very high

Recommendations: The priority for Unit 7 is management for health and diversity. This unit should be maintained at a growing stock level of 80. However, mitigation of dwarf mistletoe trees may require an even lower basal area in some areas. Creating a 50 foot buffer may be

appropriate, to prevent spread. In general the same management and slash disposal guidelines should be followed as in previous units. In areas that have species other than pine; the management should be to improve growing conditions for these species. This unit was extremely rocky and inaccessible in places, thus it is a low priority for forest management. Forest management is most feasible in the portions of this unit that are in southwest corner of the property.

Lastly portions of this unit include riparian areas, including Mill Creek and at least one intermittent stream. Management efforts should protect these areas; consult the Water section and Appendix K for more information on Best Management Practices.

Ten-Year Work Plan

The following is a suggested ten-year work plan. Management activities are listed in order of priority. Priorities may and should be changed as necessary to meet new opportunities and changing forest conditions. As always, the landowner should work with a professional forester to update and change this plan as needed.

<u>Year</u>	<u>Unit</u>	<u>Recommendations</u>	<u>Acres</u>
2010	All	Mark all boundaries well	-
	1	Thin to mitigate fuels and insects & disease (planned ARRA)	22
2011	1	Burn/dispose of slash	22
	2	Thin to mitigate fuels and insects & disease	12
	All	Monitor for insects & disease	
2012	2	Burn/dispose of slash	22
	All	Monitor for insects & disease, burn/dispose of slash	
2013	5	Thin to mitigate fuels and insects & disease	6
	3	Thin to mitigate fuels, insects & disease in northern portion	3
	All	Monitor for insects & disease, burn/dispose of slash	
2014	6 & 7	Thin mitigate fuels, insects & disease in the SW corner	3
	All	Monitor for insects & disease, consider new treatment areas Check and maintain boundaries Burn/dispose of slash where appropriate	
2015	1 & 2	Burn/dispose of any remaining slash	
	All	Monitor for insects and disease, treat new infestations	
2016	3	Burn/dispose of any remaining slash	3
	All	Monitor for insects and disease, treat new infestations	19
2017	All	Monitor for insects and disease, treat new infestations	32
2018	5	Burn/dispose of any remaining slash	6
	All	Monitor for insects and disease, treat new infestations	
2019	6	Burn/dispose of any remaining slash	3
	All	Monitor for insects and disease, treat new infestations Check and maintain boundaries	

Glossary of Terms

All Age - In a stand of trees where there are considerable differences in ages of trees and in which three or more age classes are represented.

Artificial Regeneration - Where artificial means such as seeding or planting are used to establish a stand of trees.

Basal Area - A measure of density. It is the square footage of stump tops that would be exposed on an acre if all the trees were cut off at 4 ½ feet above the ground. Often expressed as BA/Acre.

Board Foot - A board foot is 1' x 12" x 1" (l x w x h).

Chipping - Refers to the chipping of logging slash, insect killed material, thinning residue, or potential wildfire fuels into small chips or flakes by a mechanical device. Chips make good mulch if not piled too deep.

Cord - A unit of wood volume equal to a stack 4' x 4' x 8' solid. (128 cubic feet).

Crown Cover (or Canopy Cover) - the ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeters and commonly expressed as a percent of total ground area

Cutting Cycle - The time interval between treatments.

DBH (Diameter at Breast Height) - The measurement of tree diameter at a point 4 1/2 feet above the uphill ground level. Usually expressed in inches.

Dog Hair - A stand of trees growing so closely together as to give the impression the trees are "as thick as hair on a dog's back."

DMR (Dwarf Mistletoe Rating) - Refers to Hawksworth's 6-point rating level for measurement of differing levels of dwarf-mistletoe infection.

Entry - Actual entering of stands for treatment purposes.

Ephemeral Stream - a stream or portion of a stream that flows only in direct response to precipitation, receiving little or no water from springs and no long continued supply from snow or other sources, and whose channel is at all times above the water table

Found in 2010 Stewardship
Plan

POUDRE VALLEY RURAL ELECTRIC ASSOCIATION, INC.
RIGHT-OF-WAY EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that the undersigned, are the owner(s) of record and for a good

Colorado State University

Print Full Name(s)

and valuable consideration, the receipt whereof is hereby acknowledged, does hereby grant unto Poudre Valley Rural Electric Association, a Corporation, whose post office address is Fort Collins, Colorado, and to its successors or assigns, a perpetual easement upon the lands of the undersigned, more particularly

described as follows: Book #496 Page #464
(If Subdivision, give description)

NE 1/4 Sec. 26 Twp. 7N Rge. 70W
for the purpose of placing, constructing, operating and maintaining an electric line or system on, over or under the above-described lands; to inspect and make such repairs, changes, alterations, improvements, removals from, substitutions and additions to its facilities as the Association may from time to time deem advisable, including, by way of example and not by way of limitation, the right to increase or decrease the number of conduits, wires, cables, handholes, manholes, connection boxes, transformers and transformer enclosures; and the right to cut and trim trees and shrubbery to conform to the specifications of the Rural Electrification Administration and to cut down from time to time all dead, weak, leaning or dangerous trees that are tall enough to strike the wires in falling, and to keep the easement and the adjoining area within 8' of said easement clear of all buildings, structures or other obstructions; and to license, permit or otherwise agree to the joint use or occupancy of the lines, system or, if any of said system is placed underground, of the trench and related underground facilities; together with the right of access for ingress and egress over lands of grantor adjoining the easement described above and the right to use the roads or trails whether public, private, or dedicated.

The undersigned warrants that he is the owner in fee of the above described lands and that the said lands are free and clear of liens and encumbrances of whatsoever character except the following:

The undersigned agrees that all poles, wires, and other facilities installed on the above described lands shall remain the property of the Association, removable at the option of the Association.

IN WITNESS WHEREOF, the undersigned has set his hands and seal this 5th day of June, 1978.

Signed, sealed and delivered in the presence of:

x Max A. Binkley
Owner Max A. Binkley
Vice President for Finance
Colorado State University

Duff McIntosh
Witness

Witness

State of Colorado: County of Larimer

The foregoing instrument was acknowledged before me this 5th day of June, 1978.

By Max A. Binkley

My Commission Expires May 4, 1982

Elizabeth F. Simpson
Notary Public

I have read, understand and acknowledge receipt of a true copy of this document.

Initial _____ Date _____

Approved _____	Work Order No. _____	Line Location _____
Association Representative		